

**Appl. No.: 10/705,184  
Amdt. dated January 31, 2005  
Reply to Office Action of November 11, 2004**

### **REMARKS**

Based on the above amendment and the following remarks, applicants respectfully submit that all the pending claims are in condition for allowance.

#### **Status of the Claims**

Claims 12-22 were pending. Claims 12-14, 16, 18-20, and 22 have been amended. Claims 15, 17, and 21 have been canceled. Claims 23-35 have been added. Claims 12-14, 16, 18-20, and 22-35 are now pending.

Claims 18 and 22 have been amended solely to alter their dependency from canceled claims 17 and 21, respectively. Claims 13, 14, and 19 have been amended solely to replace “surface” with “known surface” as this change was made in claim 12, from which these claims depend. Claim 16 has been amended to alter its dependency from cancelled claim 15 and to replace “surface” with “known surface” as this change was made in claim 12, from which this claim depends. Claim 20 has been amended to reflect the addition of a processor to claim 12, from which claim 20 depends. Claim 23 is a rewrite of claim 16 in independent form including all of the limitations of the base claim and any intervening claims.

#### **Objections to the Abstract**

The examiner objected to the abstract because of the use of the terms “[t]he present invention” and “is disclosed.” Applicant has amended the abstract to remove these terms and to correct a typographical error.

#### **Objections to the Specification**

The examiner objected to the specification, requiring that a reference to a patent application number be replaced with a reference to the now issued patent. Applicant has amended the specification accordingly.

**Rejections under 35 USC § 102**

Claim 12-15 and 17-22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,041,861 (“Mandal”). Claims 12-15, 17, and 19-22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,709,357 (“Maki”). For a reference to anticipate a claimed invention under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or inherently. Applicant respectfully traverses these rejections because neither Mandal nor Maki teach or suggest all of the limitations of claim 12 as amended.

Claim 12, as amended, recites

a processor coupled to the acoustic transducer, wherein the processor calculates theoretical acoustic signal reverberations by combining a frequency domain response of the acoustic signal reflection with a theoretical frequency domain response of the known surface, and wherein the processor relates the received acoustic signal reverberations with the theoretical acoustic signal reverberations to determine the one or more fluid properties.

(emphasis added). Mandal teaches a processor that determines the impedance of cement between a borehole casing and a wellbore. Mandal further teaches that the impedance of the transmission medium, mud, is determined as part of the calculation of the impedance of the cement. (See col. 6, line 59 – col. 7, line 12) Per Mandal, the impedance of the mud is derived from the density of the mud and the velocity of an acoustic wave in the mud. Mandal states that methods to determine the density of the mud and the velocity of an acoustic wave in the mud by measurement are well known. (See col. 7, lines 35-47) Mandal clearly does not teach or suggest a processor that determines one or more fluid properties by relating “the received acoustic signal reverberations with the theoretical acoustic signal reverberations” as recited by claim 12.

Maki teaches a microcomputer that controls a downhole tool to acquire signals at desired locations in a well casing and generates a log indicating thickness of the casing and bonding of the cement around the casing at those locations. The microcomputer applies an adaptive filter processor to each received signal to calculate filter parameters that best represent the signal. The

**Appl. No.: 10/705,184**  
**Amdt. dated January 31, 2005**  
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microcomputer then uses these parameters to calculate the thickness and bonding. (See col. 7, lines 42-67) The adaptive filtering process taught by Maki analyzes “the received signal to determine both the frequency of the damped sinusoid [and] its exponential decay rate.” (Col. 4, lines 63-67) In other words, the adaptive filtering process extracts signal parameters directly from the received signal rather than from a relationship between the received signal and a theoretical response, as is required by Claim 12.

Applicant traverses the examiner’s equating of Maki’s “attenuation values” with “reduced density values,” because Maki nowhere uses the term “density,” much less the definition recited.

For at least these reasons, Applicant submits that the cited references fail to teach or suggest each element of Claim 12. Accordingly, claim 12 and its dependent claims are allowable over the cited art.

### **Rejections under 35 USC § 103**

Claims 12-15, 17, and 19-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,571,693 (“Birchak”).

The standard for a rejection under 35 U.S.C. § 103 is *prima facie* obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

MPEP § 2142 (emphasis added). Applicant respectfully traverses the rejections because Birchak does not teach or suggest all of the limitations of claim 12 as amended.

Appl. No.: 10/705,184  
Amdt. dated January 31, 2005  
Reply to Office Action of November 11, 2004

Claim 12, as amended, recites

a processor coupled to the acoustic transducer, wherein the processor calculates theoretical acoustic signal reverberations by combining a frequency domain response of the acoustic signal reflection with a theoretical frequency domain response of the known surface, and wherein the processor relates the received acoustic signal reverberations with the theoretical acoustic signal reverberations to determine the one or more fluid properties.

(emphasis added). Birchak teaches a processor that stores calibration data, operates various devices, and calculates various fluid properties including reflectance, acoustic impedance, speed of sound, density and attenuation using Equations 1-4. (See col. 7, lines 59-64) These calculations appear to rely on reflected signals (see col. 4, lines 25-27, 53-56) being separable from the reverberation signals (see col. 5, lines 23-29; col. 7, lines 16-19). Birchak defines  $V_r$  as the reflected wave from surface 34,  $V_1$  as the reflected wave from surface 32, and  $V_2$  as the reflected wave from surface 34. (See col. 6, lines 19-23). Birchak also defines reverberations  $V_{r2}$  and  $V_{12}$ . (See col. 7, lines 16-19) Birchak's equations 1-4 do not use the reverberation variables,  $V_{r2}$  and  $V_{12}$ . (See col. 6, lines 51-62; col. 7, lines 25-44) Thus, Birchak does not teach or suggest a processor that determines one or more fluid properties by relating "received acoustic signal reverberations with the theoretical acoustic signal reverberations" as recited by claim 12.

For at least these reasons, Applicant maintains Birchak fails to teach or suggest all of the limitations of claim 12. Accordingly, Applicant submits that independent claim 12 and its dependent claims are allowable over the cited art.

#### **Allowable Subject Matter**

The Examiner objected to claim 16 as being dependent upon a rejected base claim, but stated the claim would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant submits that claim 12, from which claim 16 depends, is in condition for allowance as discussed above. Therefore, Applicant requests that the objection to claim 16 be removed.

-Page 11 of 13-

**Appl. No.: 10/705,184**  
**Amdt. dated January 31, 2005**  
**Reply to Office Action of November 11, 2004**

Claim 23 has been added to rewrite claim 16 in independent form, including all of the limitations of the base claims and any intervening claims. Claim 23 should therefore be in allowable form. New claims 24-28, which depend from claim 23, should also be in allowable form.

**New Claims**

Claims 23-35 have been added. As previously stated, independent claim 23 is a rewrite of claim 16 which the examiner indicated would be allowable. Therefore, claim 23 and its dependent claims should be in allowable form.

Independent claim 29 recites

[a] tool for measuring one or more fluid properties that comprises: a body having an associated volume through which a fluid may pass; a metal plate with opposite sides configured to contact the fluid, the plate being fixed within the volume to contact the fluid; and an acoustic transducer affixed to the body and configured to receive acoustic signal reflections and reverberations from the metal plate.

Applicant submits that the prior art of record neither teaches nor suggests all the limitations of claim 29. Accordingly, Applicant submits that independent claim 29 and its dependent claims are allowable over the cited art.

Appl. No.: 10/705,184  
Amdt. dated January 31, 2005  
Reply to Office Action of November 11, 2004

## CONCLUSION

Applicant submits that this response constitutes a complete response to all of the issues raised in the Office Action dated November 11, 2004. Applicant has addressed the examiner's objections and responded to the various rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a).

In the course of the foregoing discussions, applicant may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. Moreover, it should be understood that there may be other distinctions between the claims and the prior art which have yet to be raised, but which may be raised in the future.

If any fees are inadvertently omitted or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Conley Rose, P.C. Deposit Account Number 03-2769/1391-24708/HEB.

Respectfully submitted,



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